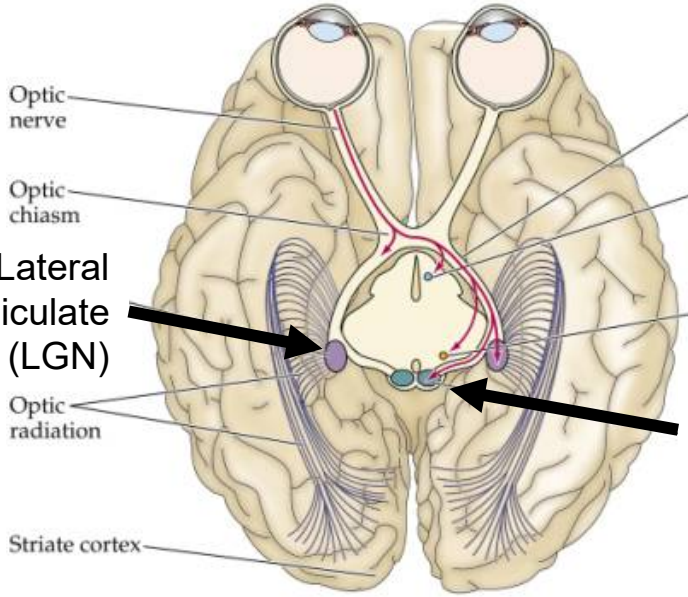
Visual system

What you need to know from this lecture:

1. Organisation of the mammalian visual pathway
2. Critical period - blindness
3. Critical period - impact of visual experience

The visual system

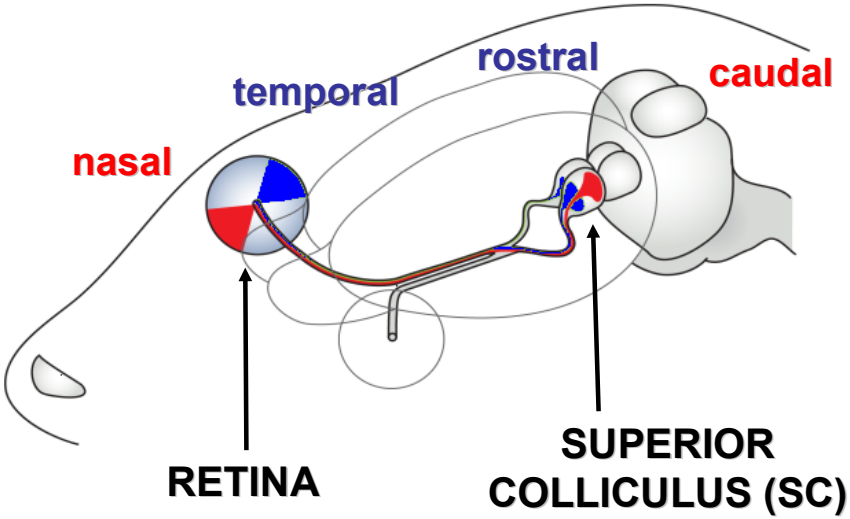
Human



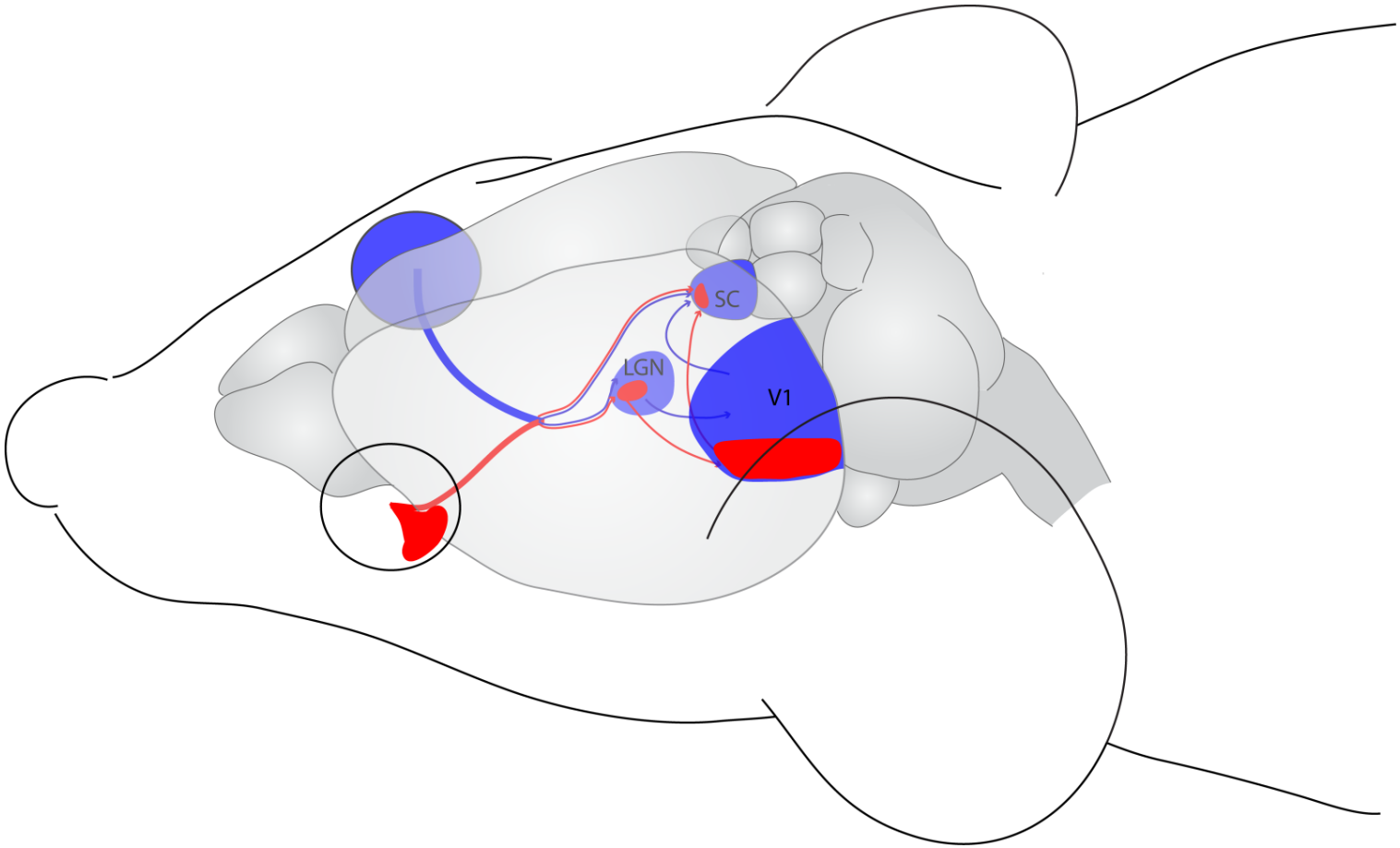
Lateral geniculate nucleus (LGN)

Superior colliculus (SC) or Tectum

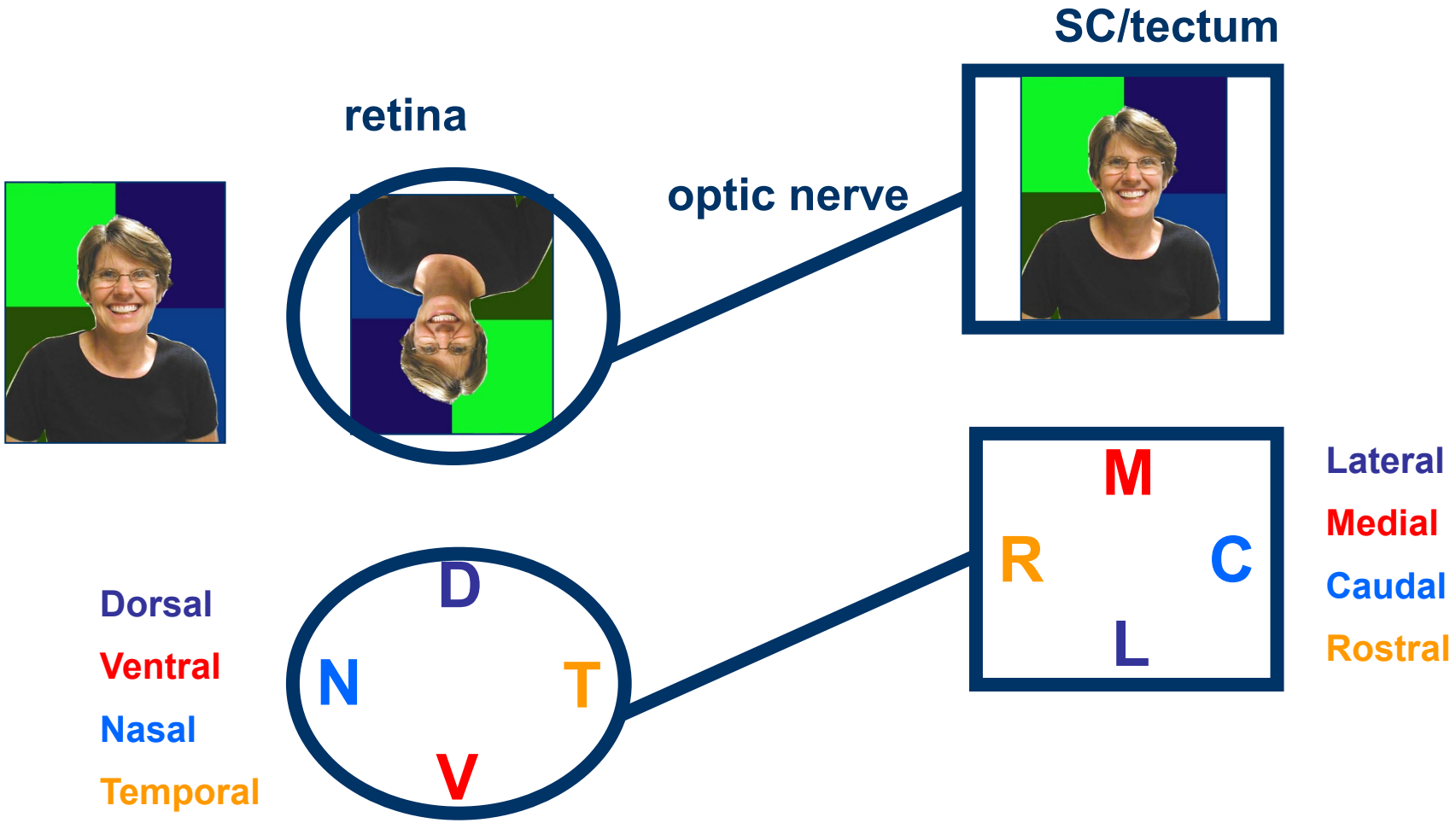
Rodent

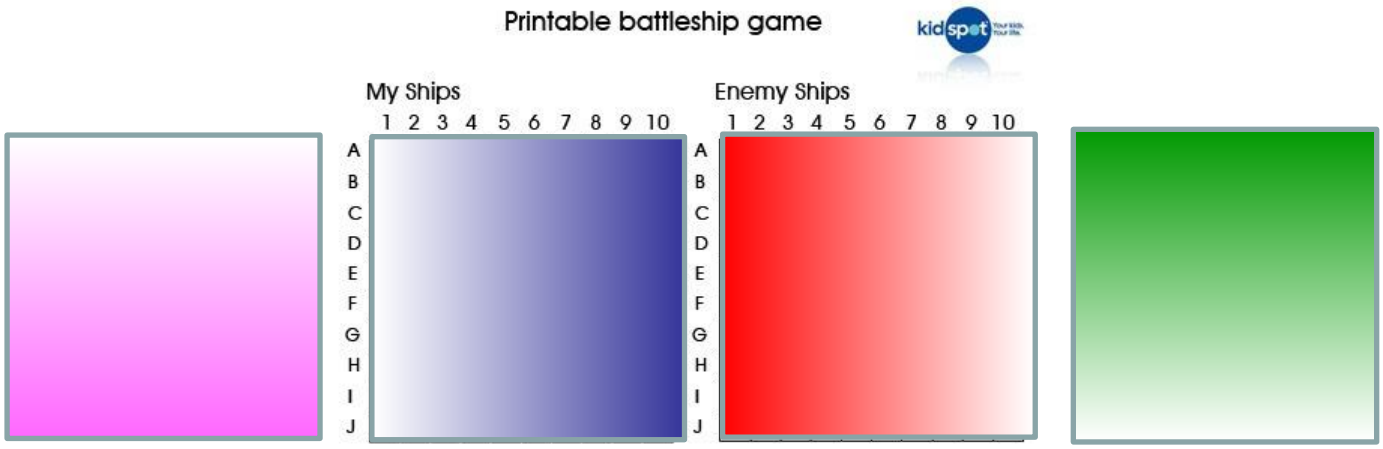


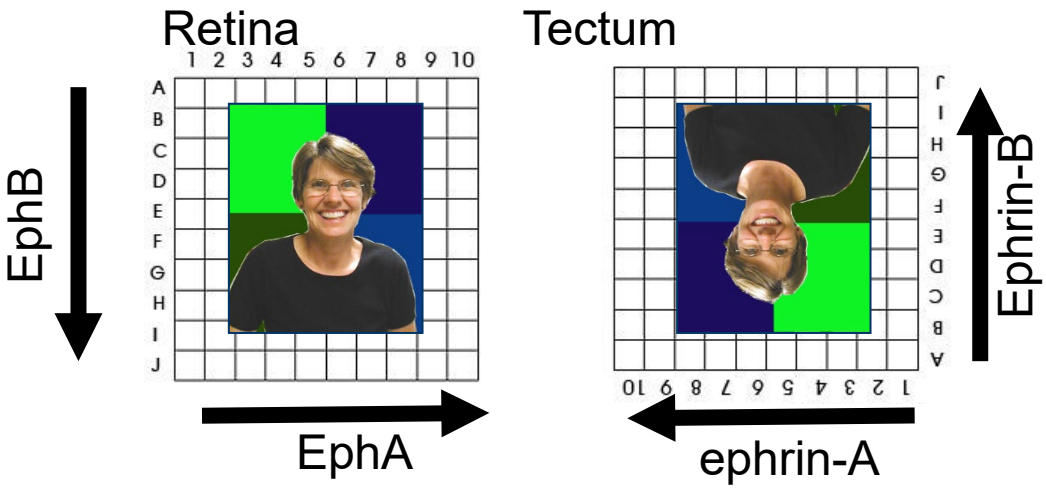
* Eye-specific mapping vs retinal topography


SC
LGN
V1

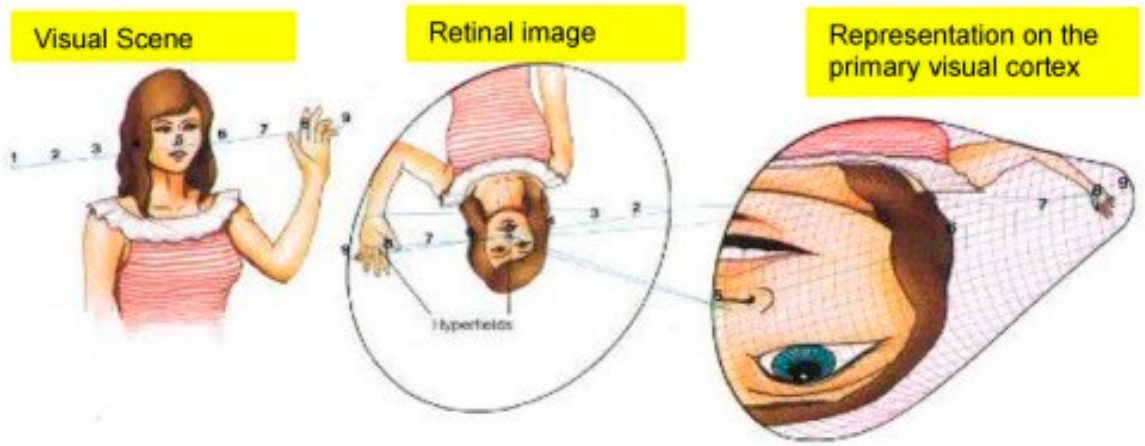
Topographic projections




Printable battleship game
kidspot
My Ships
Enemy Ships
1 2 3 4 5 6 7 8 9 10
A B C D E F G H I J


Retina
Tectum
EphB
EphA
Ephrin-B
ephrin-A
1 2 3 4 5 6 7 8 9 10
A B C D E F G H I J

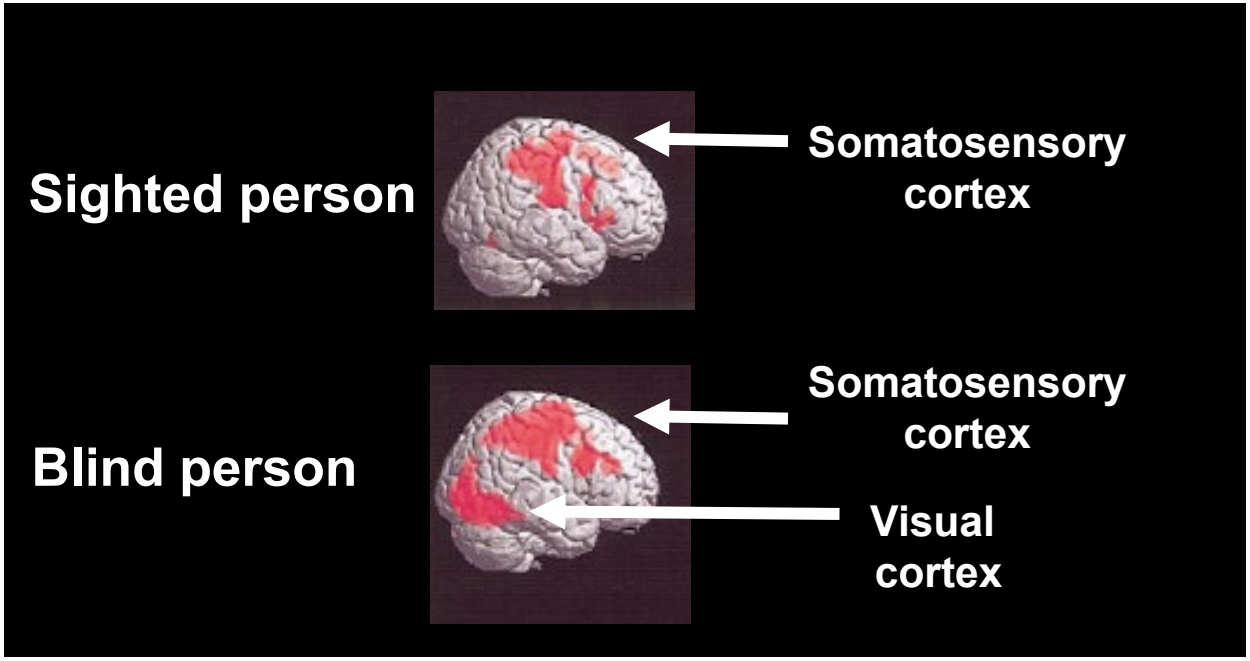
C



https://doi.org/10.1016/j.rehab.2016.01.002

Plasticity- blindness

“Blind people compensate by developing their other senses”

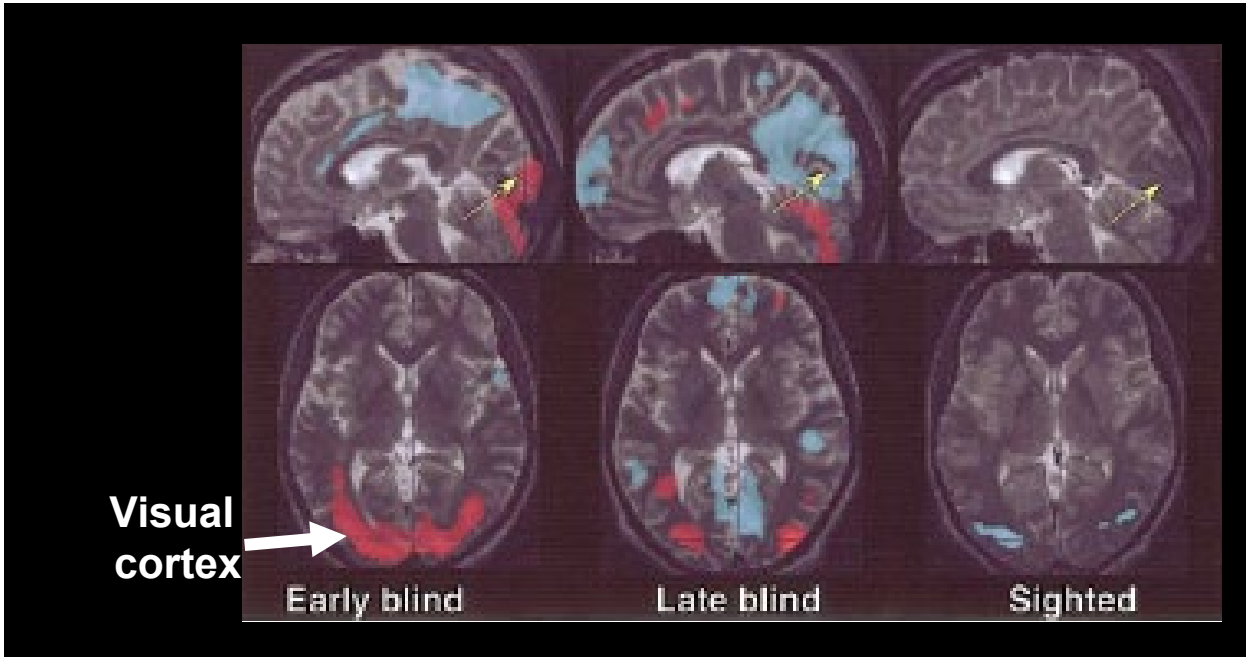


Critical period for cross-modal plasticity in blind humans: a functional MRI study.

Sadato N, Okada T, Honda M, Yonekura Y.
Neuroimage. 2002 Jun;16(2):389-400.

Plasticity- blindness

A critical period for plasticity



Activated

In response to touch

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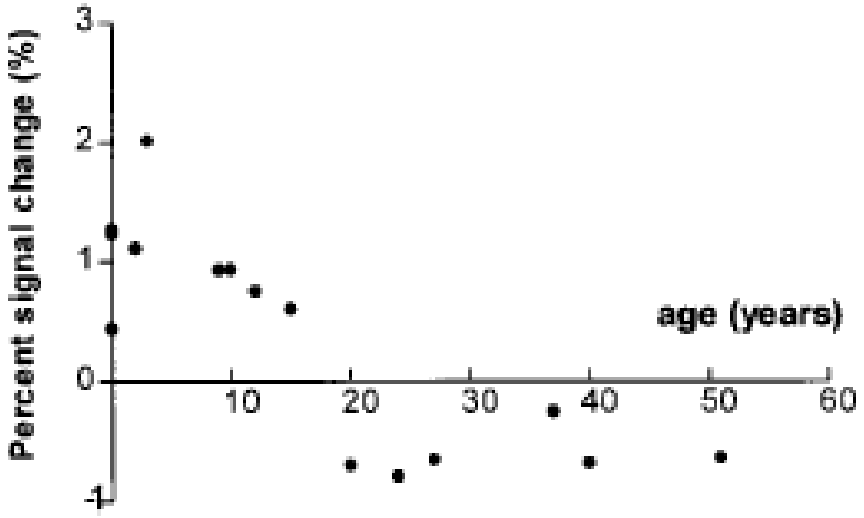
Plasticity- blindness

A critical period for plasticity



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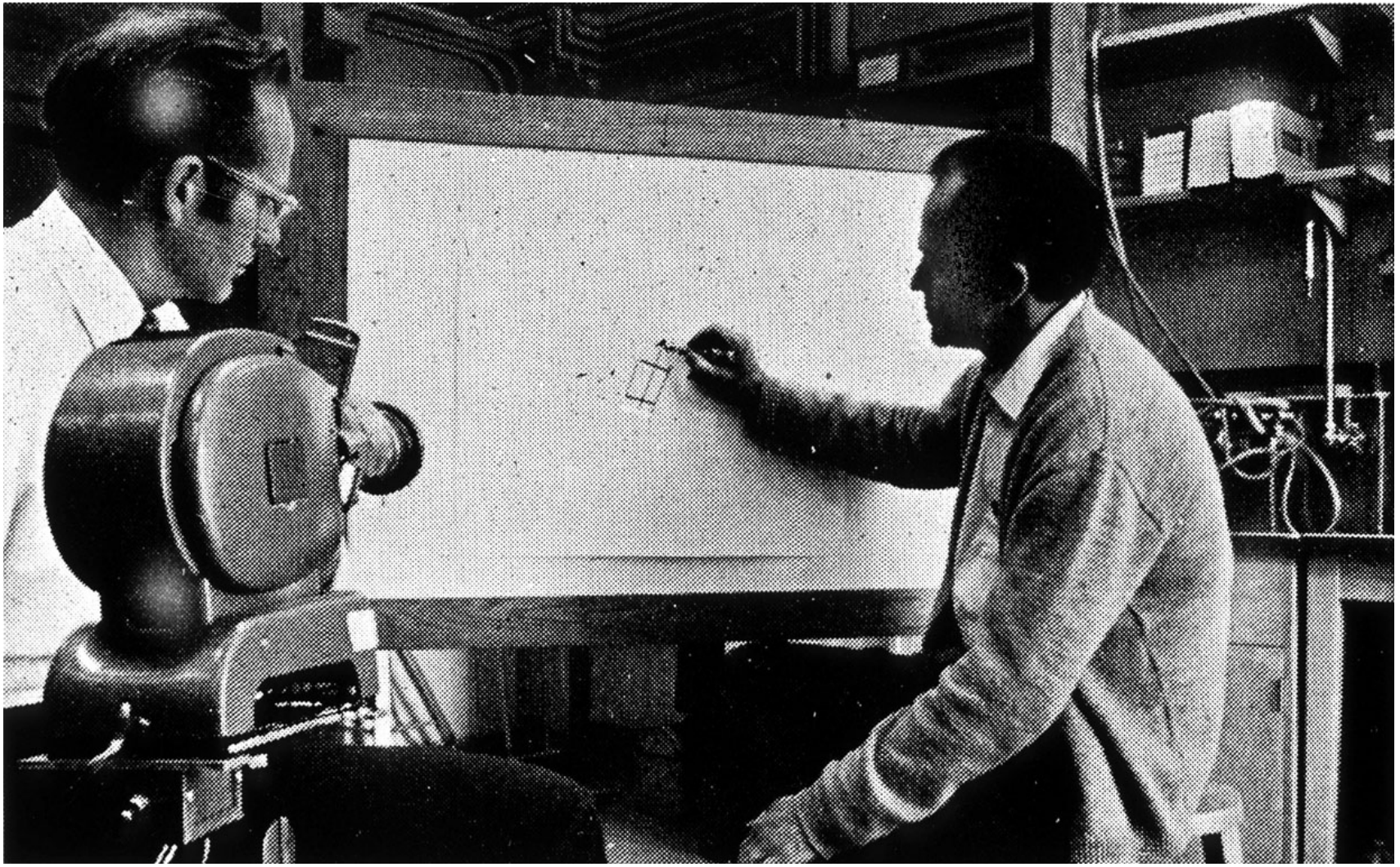
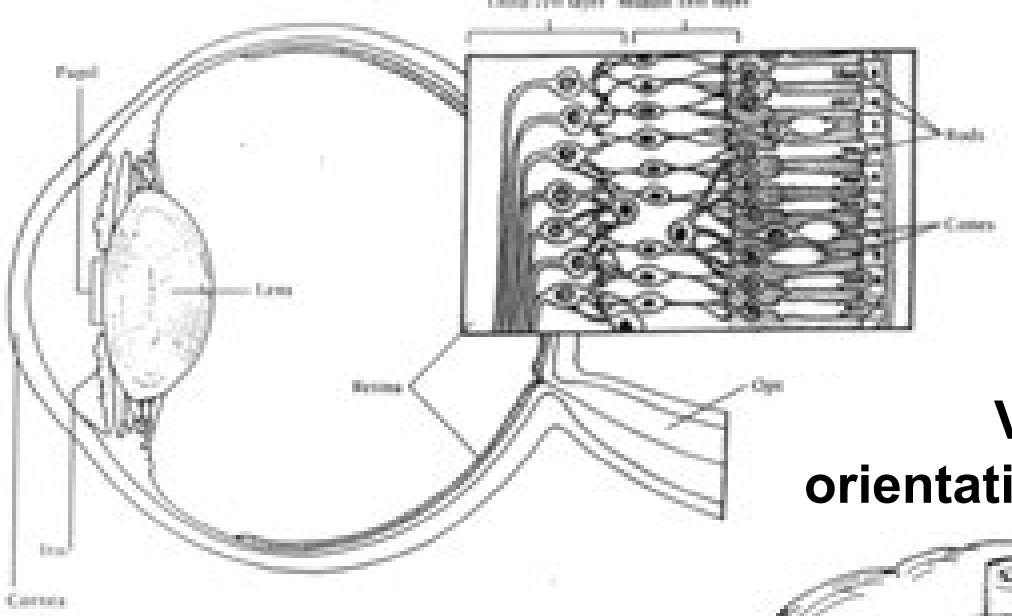
David Hubel and Torsten Wiesel discovered importance of visual experience during development (Nobel Prize 1981)





Visual cortex: orientation sensitive neurons

Lateral geniculate nucleus
LGN

Optic chiasm

Video

Key concepts:

Plasticity can happen throughout life

Activity-dependent refinement: sculpting brain circuits to be tuned to experience

The critical period sets the brain up to function within its environment